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NRO REVIEW COMPLETED

28 November 1962

MEMORANDUM FOR : The Record

SUBJECT : Status - OSCART Engine Main Fuel
Control Pilot Lot Program

REFERENCE : [redacted] titled
"Definition - OSCART Engine Main Fuel
Control "B and "C" Pilot Lot Program"

1. Reference memorandum defined and presented status of subject program as of 16 November 1962. This report based upon a visit to [redacted] on 27 November "updates" the information contained in reference report and presents status as of 27 November 1962.

2. (a) The first control of subject program, which is number 19 tentatively targeted for the first December delivery engine number 209, has successfully completed the hot fuel test. Pending successful completion of final cold fuel calibration, this unit is scheduled for delivery to Hartford on 1 December 1962.

(b) A summary of Attachment 1 which presents detailed status of subject program as of 27 November 1962 indicates the following status change since 16 November 1962:

<u>Status</u>	<u>Number of Units</u>	
	<u>As of 11/16/62</u>	<u>As of 11/27/62</u>
Finished all test and ready for delivery	0	0
Through hot test	0	1
On hot test	1	1
On cold test prior to hot test	3	7
In final assembly	3	4

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	As of <u>11/16/62</u>	As of <u>11/27/62</u>
Fabrication prior to final assembly	2	3*
(Hook-up to engine 203)	1	0
	<hr/>	<hr/>
Total Units	16	16

*This number reflects controls in the pilot lot program only. Fourteen additional follow-on units not yet part of the program are also in fabrication as explained in paragraph 3(b).

Preliminary component testing is substantiating the worthiness of incorporating silver plated speed governor servo arm shoes and has eliminated monal speed governor servo arm shoes because of excessive monal thermal expansion properties.

(c) Attachment 2 summarizes for convenience the major problems and actions reflected on Attachment 1.

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(a) Complete backup hardware for all engineering changes reflected in Attachment 1 for all controls in the pilot lot program was not in effect but now is being strongly evaluated as of 27 November. This evaluation deals with all changes not already scheduled for incorporation on all 16 pilot lot units. Hardware lead time appears to be the crux of this evaluation as to determining which units should be backed up now. A ground rule has been tentatively established which dictates that for changes requiring equal to or less than 60 days hardware lead time, a backup for each change shall be planned for at least all 16 units. For changes requiring greater than 60 days hardware lead time, backups for each change shall be planned for all 16 units plus as many follow-on units required in order to assure having the backup available when the unit reaches the assembly floor. Headquarters is to be advised upon completion of this determination.

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(b) Production units following the pilot lot program are continuing through fabrication and upon completion parts will be held in finished stores prior to assembly. As a pilot lot unit reaches delivery, a follow-on unit will replace it in the pilot lot program. For instance, the delivery of unit 26 as a mock-up for engine 208 has been replaced by unit 35 into the second block of eight. The program is now of a 7/9 configuration.

The 35th unit is now the latest or newest unit in the program and a tentative February delivery. Follow-on units number 36 through 49 now in fabrication are scheduled to finished stores prior to assembly from 30 November to 19 December respectively. Lead time from starting assembly to delivery has been running from 6 to 8 weeks. On this basis, units 36 through 49 will have from 6 to 10 weeks available for assembly and test in order to follow number 35 in late February.

(c) There are four controls in the pilot lot program having the "Y" cam schedule which is not desirable for use with the "30K" afterburner. They are numbers 16, 18, 22, and 25. Unit 25 on hot test now is tentatively scheduled for Florida. Every effort will be made to incorporate the desired "X" cam into units 16, 18, and 22 now on cold test if delivery is not seriously compromised further. Preliminary estimates indicate a 3 to 4 day delay for each unit to make the change if calibration is not too far advanced. This possibility is now being evaluated by [redacted] Pratt & Whitney.

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(d) The writer is convinced that a continuous 450° fuel temperature must be imposed on each control during hot acceptance testing in order to attain the proper hot to cold calibration required for each 3.2 operation. The writer is not convinced that the time at this temperature should exceed 14 hours except for those units encountering difficulty or performing development testing.

(e) [redacted] assures that hot fuel recirculated through test rigs during acceptance testing is examined each day for deterioration. At present, 2200 gallons per month is removed and replaced by fresh fuel. Closer examination is being initiated.

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(f) Vaseline which has been used during assembly of seals only has resulted in deposits and has been replaced with a Dow-Corning Silicone which is soluble in the fuel.

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[redacted]
Development Division
OSA-DD/R

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DD/OSA [redacted]

Distribution:

- 1-DD/R
- 2-AD/SA
- 3-C/DD/OSA
- 4-5-DD/OSA
- 6-TAES/OSA
- 7-AFCIG-5
- 8-HH/OSA
- 9-DD (Chrono)

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7. AIR 9. WING 100. BOMBARDIER MAIN FUEL CONTROL SYSTEM AS OF 27 NOVEMBER 1962

First Block of 7 Units	1	2	3	4	5	6	7
Production Serial Number	25	22	16	27	20	13	19
Present Status	Not Test	Cold Test	Cold Test	Cold Test	Cold Test	Cold Test	Through Not Test

Engineering Action/Changes: Change Type

- | | | | | | | | |
|---|------------|---|---|---|---|---|---|
| 1. Partial speed governor servo/speed governor pilot valve reinspection check list and log. | Durability | X | X | X | X | X | X |
| 2. Speed governor bearing anti-rotation link. | Durability | | X | X | X | X | X |
| 3. Discreet clearance speed governor pilot valve damper to bore | Durability | | X | X | X | X | X |
| 4. Inlet temperature servo piston leakage check. | Accuracy | X | X | X | X | X | X |
| 5. Incorporate 18 "Y" engineering changes. | Accuracy | | | | X | X | |

Second Block of 9 Units	1	2	3	4	5	6	7	8	9
Production Serial Number	31	34	21	20	24	32	31	30	35
Present Status	Feb Be- fore Assy	Feb Be- fore Assy	Final Assy	Final Assy	Cold Test	Final Assy	Final Assy	Cold Test	Feb Be- fore Assy

Engineering Action/Changes: Change Type

- | | | | | | | | | | |
|--|------------|---|---|---|---|---|---|---|---|
| 1. Full speed governor servo/speed governor pilot valve reinspection check list and log. | Durability | X | X | X | X | X | X | X | X |
|--|------------|---|---|---|---|---|---|---|---|

Second Block of 9 Units		1	2	3	4	5	6	7	8	9
Production Serial No.		33	34	21	20	24	32	31	30	35
2. Speed governor bearing anti-rotation link.	Durability	X	X	X	X	X	X	X	X	X
3. Longer lead splier (pilot valve support).	Durability	X	X	()	()					
4. Metal speed governor servo cam shoes.	Durability	This change eliminated from #24 and #32 because of excessive thermal expansion.								
5. No piston rings on speed governor servo cam shoes.	Durability			X	X					
6. Silver plated speed governor servo cam shoes.	Durability	X	X			(*)	(*)			
7. Incorporate 12 "Y" engineering changes.	Accuracy	X	X	X	X	X	X	X	X	X
8. 50% annulus inlet temperature pilot valve.	Accuracy	X	X	()	()					
9. Inlet temperature servo piston leakage check.	Accuracy	X	X	X	X	X	X	X	X	X
10. Thick reset link.	Accuracy	X	X	X	X					X
11. Vented spring/dinetal package.	Accuracy	X	X	X	X					X
12. Loose speed governor flyball pin.	Accuracy	X	X	X	X	X	X	X	X	X
13. Teflon sleeves replace piston rings on speed integrating piston.	Accuracy	X	X							

NOTE: X - Indicates change incorporation.

() - Indicates change eliminated because of hardware lead time (15 wks. previous) incompatible with control schedule.

(*) - Indicates hardware for this change being held as backup for this control.

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Attachment 2

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MAIN FUEL CONTROL

MAJOR PROBLEMS & CORRECTIVE ACTIONS

A. RELIABILITY:

(1) Speed governor servo wear and seizure:

- a. Teflon additive to fuel.
- b. Speed governor servo check list.
- c. No piston rings.
- d. Silver plated cam shoes.

(2) Speed governor pilot valve wear and seizure:

- a. Teflon additive to fuel.
- b. Speed governor pilot valve check list.
- c. Longer land spider.
- d. Speed governor pilot valve bearing anti-rotation link.
- e. Diametral clearance speed governor pilot valve damper to bore.

B. ADHERANCE:

(1) Inlet temperature servo shifts:

- a. Y+ changes.
- b. SOX annulus inlet temperature pilot valve.
- c. Inlet temperature servo leakage check.

(2) Fuel/air ratio linkage shifts:

- a. Y+ changes.
- b. Thick reset link.

(3) Hot shifts:

- a. Y+ changes.
- b. Tested spring/hi-control package.

(4) Speed/revolve area system improvements:

- a. Y+ changes.
- b. Loose flyball pins.
- c. Teflon chevrons on integrating pistons.

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